$ 1.50

denver apple pi Seed

Newsletter for Denver's Apple users

Volume 7 Number 1 JANUARY 1985

LISP

RECURSIVE LISPING
by André van Meulebrouck

In this article (of a more-or-less continuing series), we will write a recursive LISP function. This article should provide you with enough insight into recursion to make you dangerous.

We have played with the pebbles on the beach long enough. By now I'm sure you're anxious to go for a swim...

All examples in this article were run in XLISP for verification as to their correctness. XLISP is in the Denver Apple Pi library.

LISP is the easiest language I know of to learn recursion in. What you learn about recursion here should help you understand recursion in Pascal, C, and Logo. The recursion in Logo is very similiar to recursion in LISP since Logo is a subset of LISP.

Recursion is a function calling itself from within itself, in other words, a function which defines itself in terms of itself. This works, because a function defines itself not just in terms of itself, but in terms of progressively simpler cases of itself.

Basic is not recursive per se. Basic will allow you to gosub to a subroutine you are already in, if you want to. The Basic interpreter will keep track of pairing the returns with the appropriate gosub points, but it will NOT keep track of any intermediate results that such calls created. You can keep track of intermediate results yourself using arrays perhaps, but doing such might be more educational than practical. Recursion in LISP is both easy and natural, and the LISP interpreter keeps track of all the intermediate results for you.

If a function calls itself, the call chain will go on forever, unless a stop condition is put in. When the stop condition is arrived at, the recursion will stop (and unwind itself if need be). To test for a stop condition, we need a test function. The one we will use is called: null. Null checks to see if an argument (parameter) is an empty list. If it is, it returns a t for true. Otherwise, it returns a () for nil. Examples;

(null '()) returns t
(null '(x)) returns () for nil or false

To get the interpreter to evaluate conditionally, the LISP primitive cond is used. When cond is encountered, the interpreter will evaluate conditionally within the list cond occurs in. This evaluation continues until a t is found. The first evaluation that yields a t (for true) will have its argument returned as the final value of the conditional list. A conditional list can have an arbitrary number of conditions in it.

Some functions that will be used in the example function are append and list. Append makes one list out of the two that are handed to it. List makes a list out of the argument handed to it. Examples;

(vCCacy S`v e. S`p y.. tasftcn `v e p y.

(list 'a) returns (a)

(list '(a)) returns ((a))

GOTO $B

$2

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MEMBERSHIP INFORMATION
$10 APPLICATION FEE AND $18 PER YEAR DUES

APPLE PI is an Apple Computer Users Group - not affiliated with Apple Computer, Inc. - that provides many member benefits, some of which are:

MONTHLY MEETINGS-

On the first Thursday of each month at 7:00 p.m. APPLE PI holds its general meeting at the Greene Center, Colorado School of Mines Campus, Golden, Colorado. This meeting is a combination of an informational meeting, new product announcements, and a short business meeting. The members are given an opportunity to buy computer supplies a little above cost. Software products are given away as door prizes.

On the Sunday following the general meeting there is an informal meet which is usually held at the home of a member, the location of which is announced in the newsletter and at the general meeting. This meeting is from 10:00 a.m. until 3:00 p.m. and provides a more informal environment to seek or give advice to fellow members and get copies of programs from the APPLE PI Library. Both of these meetings are open to the general public but only members have access to products that are sold.

PROGRAM LIBRARY-

APPLE PI currently has a library of 8,000 programs. All current disks are in 16 sector (3.3, Pascal, CP/M) format and are available to any member. APPLE PI Members can obtain copies from the library:

1) By coming to the monthly informal meeting (swap meet);
2) By written request to the club librarian (at any meeting or by mail);
3) By electronic mail on APPLE PI's bulletin board system:

When requesting copies, please include the following information:

a) Your Name, Address, and Phone number;
b) Disk Category and Volume Number;
c) Blank Diskette(s) or request to utilize a new disk (member will be charged $2.50 for the new disk);
d) Copy fee ($1.00 per diskette side unless you donate a program you have written at the same time and fill out a Progam Submission Form). Only complete sides of disks will be copied.
e) Instructions on how the disks are to be returned, i.e., at the next meeting, by mail, etc. (IF RETURN IS TO BE BY MAIL PLEASE BE SURE TO INCLUDE A STAMPED, SELF-ADDRESSED FLOPPY DISK MAILER, AND $2.50 TO COVER SHIPPING COSTS).

DISK OF THE MONTH-

Each month a collection of some of the best programs donated to APPLE PI during the preceding month are made available. The DOM can be purchased at any group meeting or by mail.

DUES-

Current membership dues are $18.00 per year, with a one-time application fee of $10.00. Checks should be made payable to APPLE PI.

$3

BASICS

Jeff Beehler

When I left off in November, I was discussing basic computer hardware terms. These terms, which don't necessarily have to be known to use a computer, are helpful when you are considering purchasing a computer, or if you are interested in certain applications. If you missed last month's article, don't fret, because I will attempt to keep this information at ground level so I don't lose anyone.

This month, I will get a bit more specific and discuss the Apple // family. These computers include the Apple , the +, the //e and of course the //c. The basic operating system for all of these are very similar, so I can describe them without too much difficulty.

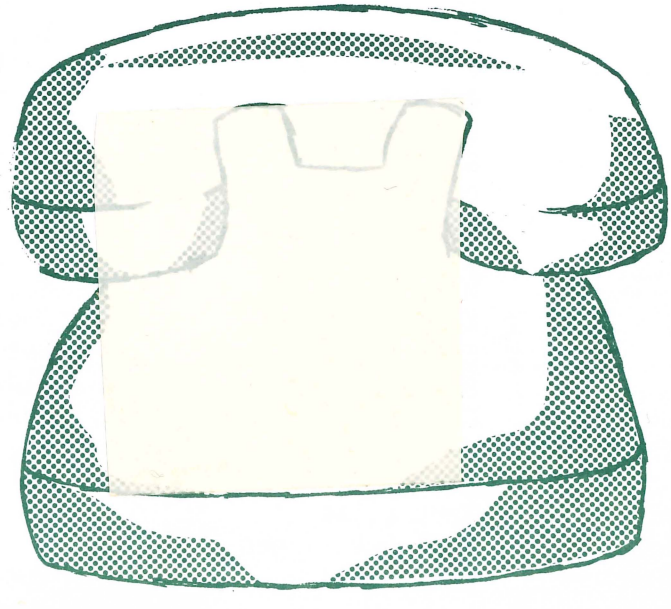
First, let's start with how to turn the computer on. Now this may sound very elementary, but if we don't start with the basics, I can't be sure that I have covered everything. Before you turn on the computer , make sure that you have the power cable to the computer plugged into a 3-pronged output. This is to ensure that the computer is grounded. One of the biggest enemies of a computer, is static electricity, and without a proper ground, you run the risk of seriously damaging your computer. Simply make sure that you have the computer grounded.

Now that I am done giving my electricity lecture let's turn the computer on. The power switch for an Apple computer is on the left hand side on the back of the computer as the keyboard is facing you. As soon as you have turned the computer on, you will notice that the disk drive will start spinning. The 'IN USE' light also turns red. Without a diskette in the drive it will continue to spin until the power is turned off again. Turn the power bk for an Apple is a 5 1/4 inches square plastic media that can store information from the computer. Actually, the disk is inside the square covering, and is circular. As it spins inside the disk drive, a small device reads and/or writes information, magnetically, on to the disk. This one of the most used input and output devices on a personal computer, next to a keyboard.

The biggest problem with disks, is that they are very sensitive to dust, grease, finger prints, and other particles in the atmosphere. If you are very careful about keeping the disk inside the white envelope it came in at all times that it is being stored, you will have minimal problems. But remember to take the disk out of the WHITE envelope before trying to insert it into the drive. Do not try to take the circular disk out of the protective casing with the large holes in it. That will ruin you media. As a rule of thumb, try to keep the label that is affixed to the diskette, under your thumb at all times, and use only one hand on the diskette at a time, this keeps unneccesary finger prints from damaging the information stored on your disk.

Now simply insert the diskette into the disk drive and gently close the disk drive door. Now turn the computer back on and use your disk.

Next month, will continue this discussion on disks, and on how to properly use one once your computer is on. Until then, happy computing.



WINNER OF DOOR PRIZE	NAME OF DOOR PRIZE	CONTRIBUTOR
J. Knowles	HabaTemplate	Adams Computers
Jeff Beehler	Hayden Shapes & Colors	Programs Unlimited
Gary Dowdy	Locked Storage Case	Apple PI
Randy Ansley	Epson Connection Book	Epson
Terrill Malluk	Crypto Program	Byteworks
Debra Hoffman	Locked Storage Case	Apple PI
Dave Nelson	300 Baud Modem w/software	CW Electronics
Alexandra Reagan	HabaTemplate	Adams Computers
Jim & Kathy Mellnick	Apple Business Graphics	Connecting Point
Thornton HS computer club	Stat 2: Business Analysis	CW Electronics
Andre' VanMeulebrouck	Pro Dos Basic Programming	Adams Computers
Jim Mundel	Pro Dos Workbench	Adams Computers
James Thompson Family	Snowfile Program	Snowbound Tech.
John Beach	Netmaster Program	CW Electronics
JoAnn Hundon	Lead Glass Apple	Randy Ansley
Dewey Beck	Bug Trap	Randy Ansley
Mel Ryan	A+ Disk	Neighborhood Comp.
George Willettt	Grappler +	Siemens Corp.
Will Kealiher	Leaded Glass Apple	Randy Ansley
William Anderson	Disk box with disk	Apparat, Inc.
Dave Sturtz	HGR6 Program	ALF, Inc.
Ernest Reeve	Book: How to protect your inventions	Apparat, Inc.
James Tackett	Bug Trap	Randy Ansley
Ed B. Wood	Disk Box with disk	Apparat, Inc.
James Funk	Bug Trap	Randy Ansley
Greg Peterson	A+ Disk	Neighborhood Comp.
Richard Hergenreder	A+ Disk	Neighborhood Comp.
Eric Durham	Cut and Paste Program	Softwaire Centre
Kenneth Chen	Book: Custom Apple & Other	Apparat, Inc.
Vincent Maess	A+ Disk	Neighborhood Comp.
Robert M. Pierson	Total Accuracy Copy Program	ALF, Inc.
Lloyd Bowles	Book: Custom Apple & Other	Apparat, Inc.
Paul Chamberlin	A+ Disk	Neighborhood Comp.
Tom Devenish	Bug Trap	Randy Ansley
David Poole	Stat 1: Statistical Anal	CW Electronics
Craig Wasinger	Bug Trap	Randy Ansley
G & B Curtis	Apple DOS Book	Steven Martin
Ralph & Marilyn Graybill	Machine Language	Steven Martin
Eldon Jones	Starting Forth	Steven Martin
Gail McClish	Multiplan multi-tool budget	Adams Computers
David R. Street	Pascal Programs Book	Steven Martin
Ray Ketterman	3D Graphics	Steven Martin
Tim Kealiher	B1 Bomber	Steven Martin
Mark Trevithick	Bug Trap	Randy Ansley
Ken Jentsch	Operation Apocalypse	Steven Martin
Bill Barclay	Netmaster Software	CW Electronics
Bill Hatchett	Midway Campaign	Steven Martin
Charles Johnson	Tanktics	Steven Martin
Wilford E. Hill	Bug Trap	Randy Ansley
Robert L. Davis	Anti-static Dust Cover	Colo Computer Acce
Gary Elias	Crypto Program	Byteworks
Paul Swearingen	Disk Box with disk	Apparat, Inc.
Erwin Bell	Bug Trap	Randy Ansley

WINNER OF DOOR PRIZE	NAME OF DOOR PRIZE	CONTRIBUTOR
John Peterson	Bug Trap	Randy Ansley
Larry Newton	Book: I Hate Computers	Programs Unlimited
Glen Hayhurst	Disk Box with Disk	Apparat, Inc.
Richard Cress	Tree Ornament	Liane Nusse
Dave Gillespie	Magic Window Program	Steven Martin
Norman Hogg	Tree Ornament	Liane Nusse
Robert Homestead	Tree Ornament	Liane Nusse
Lee Knoll	Tree Ornament	Liane Nusse
Lisa Vitry	Tree Ornament	Liane Nusse
Thomas Tiffany	Tree Ornament	Liane Nusse
Donald Hurt	Tree Ornament	Liane Nfnna

KID'S STUFF

APPLE PI APPLESEEDS - SIG GROUP FOR EARLY COMPUTER EDUCATION

Two reviews - "States and Traits" and "Kindercomp" (Many thanks to the Apple Pi member who lent these two programs for a month of reviewing)

If you have ever experienced the frustration of not knowing exactly where Minnesota is and would like to have a better grip on U.S. geographical knowledge, this program is for you (or, especially for your kids!) It makes learning about the states and their history, traits and location a fun thing to do. Sure wish geography had been this much fun when I was in school (of course we only had 13 states then!)

Kindercomp was reviewed by a professional day care provider and a new member of Apple Pi also - As a professional day care provider I tried out Kindercomp on a variety of ages. The under fives enjoyed it the most, and had the most to learn from it. One loved the matching game and got to be a real pro! Another preferred the letter matching and became very good at matching the lower case letters on the screen to the capital letters on the keyboard - this is a great keyboard familiarity game. The drawing program was excellant for the younger kids - it is a good tool for computer familiarity, leading eventually to LOGO.

Spinnaker programs are generally dependable, and this is one of their best.

If there are any children's program needs you have please call the new Apple Pi number and inquire.

Tired Of The Tax Hassle?
Peopleware Has The Answer
TAXPAK-85

TAXPAK is an interactive income tax preparation program designed and priced for home use. It will guide you through the preparation of your 1984 (due in 1985) Form 1040 and Schedules A, B, C, G, SE, and W. It will calculate all subtotals, and perform all tax calculations automatically. When you are done, it will print the return in a format that you can send to the IRS.

TAXPAK is easy to use. It gives you an on-screen facsimile of the tax form, and provides full-screen editing capabilities, so that you can easily enter or change any amounts.

TAXPAK is fun. It operates like a tax spreadsheet. Whenever you make an entry, all affected lines of the return are recalculated and updated immediately. Information is automatically transferred from form to form. You can play what-if games with the return, and see the effects on your tax liability.

TAXPAK is fast! Your entire return is updated in less than one second after every entry of data. The results are displayed immediately.

TAXPAK is informative. A unique feature of TAXPAK is that the bottom line of the display screen is used as a status line. It will tell you how much tax you owe, or how big your refund will be. It will also tell you how much your tax liability was changed by the last entry you made. It shows your total income, adjusted gross income and taxable income. And it gives your total tax amount and your tax bracket. All this information is updated and redisplayed after each entry you make. You see the effect of every line of the return on your total tax picture, as you enter it.

System requirements: Runs on any Apple II+, IIe, or IIc with one or two disk drives. Apple II must have at least 48k and Applesoft in RAM or ROM. IBM PC version also available.

TAXPAK-85 is tax deductable at $34.95. Updates are only $19.95.

Available at the January meeting, or call Peopleware at 642-0101.

Tres. $

ENDING CASH BALANCE	10-31-84	4650.75
INCOME		
New Members		756.00
Renewal Members		450.00
DOM Sales		175.00
Library Copies		160.00
Sales of Supplies		2283.00
Seed Advertising		70.00
Interest Earned		34.24
TOTAL INCOME		3928.24
EXPENSE		
Supplies for Resale		337.06
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Postage		476.50
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BBS Expense		21.74
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Christmas Party		75.00
Equipment Purchase		85.00
TOTAL EXPENSE		2497.84
ENDING CASH BALANCE	11-30-84	6081.15
ASSETS	11-30-84	
Cash on Hand		25.00
Cash in Bank		6081.15
Inventory for Resale		5207.53
Prepaid Expense		450.00
Accounts Receivable		0.00
Equipment		2423.87
Total Assets		14187.55
LIABILITIES		
Sales Tax Accrued		164.46
Accounts Payable		0.00
Unposted Income		0.00
Total Liabilities		164.46
NET WORTH		14023.09

THANK YOU...

When you stop in to an Apple Pi member store tell them that you are with Apple Pi and thank them for the support they give. Our store members make valuable contributions to Apple Pi from special discounts to the door prizes at the meetings. When you need hardware, software or computer supplies remember our store members.

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JOHNNY APPLESEED

Dear John,

I am the system operator of a BBS that used the GBBS version 1.7 system from Greg Schaefer, and I have been hearing rumors that this "uncrashable" software is being crashed by someone. First of all, is this true, and can it be prevented?? I am a "real" owner of GBBS.

Crashed-out

Dear Crashed,

Yes, it is true that many GBBS systems have been crashed in the Denver area recently. This is because of a "back-door" that the author placed in GBBS so that he could crash selected copies of GBBS. Unfortunately, someone has found this back door and is crashing systems. Luckily, there is a fix for this program. Call Micro Data Products at (303) 364-1123.

John

Dear John,

I use an Apple at work, and I have an Apple at home. Sometimes I need to take some of my work home with me, and I need to use the software I have at work on my computer at home. Is it legal to use the "master" disk on more than one computer?

Work-A-Holic

Dear Work-A-Holic,

In most cases, it is legal to use a program on more than one computer as long as it is only being used on one computer at any given time. (Usually it isn't legal to have the same program running on different computers at the same time) Just to be safe, be sure to write the company that published the software and ask them how they feel about it.

John

Dear John,

I have a "non-glare" fabric on my Amber AMDEK monitor, and it always looks dirty. Is there any way to clean it?

Dirty Monitor

Dear Dirty Monitor,

If at all possible, try to avoid cleaning non-glare fabric screens, because the more you clean them, the worse they look. If you have to clean it, follow the manufacturers' instructions, which usually recommend a light cleaning with isopropyl alcohol. In any case, DO NOT use a commercial glass cleaner (WINDEX, GLASS PLUS, etc.) because it will clog the pores of the fabric, and make the images look blurry.

You might try a product called SCREEN WIPE from the ALDINE paper company. A "SCREEN WIPE" is a pre-moistened anti-static cleaning pad. I've used them, and I think they do a fairly good job.

John

Questions? Write to:

Johnny Appleseed
% Denver Apple Pi
P.O. Box 17467
Denver, CO 80217-0467

Core Meeting

KKBNA INC.

4251 Kipling

Librarian:

As usual, the December Christmas party/combined Core meet was a real winner for library copies. At our Christmas party, we made 420 disk copies! Unfortunately, even with 4 computers and 2 sets of the library, the lines were long and tiresome. With only two sets of the library to work from, we really can't support any more than four computers. We apologize for any delays in getting your copies made.

I would like to thank Randy Ansley, Rich Waite, Scott Elder, Jeff Beehler, and Jack Norton for helping make copies and finding disks, and SPECIAL thanks to Peggy Smith AND Bill Hatchett for helping serve refreshments. Be sure to thank each of them when you see them.

Another special winner at the Christmas Party was FREEWRITER, the public domain word-processor. By 8pm, we had sold all of the copies we had made up. For those of you that didn't get a copy, you may get one at the January meeting.

The Apple Pi library is expanding all of the time. We add disks constantly, so please be sure to have your library disk updated often. Speaking of additions to the library, many of you know that we have had a Pascal section of the library and CP/M section of the library, but we had no list of what was in it. Now, thanks to many hours of work by Alexandra Reagan, we now have a hard copy list of what is on all of those disks. This hardcopy can be found in the our hardcopy catalog listing which you may check out with your membership card at a Core meet.

Have you written a program lately? If so, consider contributing it to our library. Not only will your name be spread around the members, but you will receive a free disk copy of your choice. Let's have a great 1985 - contribute a program to the library.

-- Trent Hein, Librarian --

PRES Report

From the Directors and Officers of Apple PI, we want to wish you a Happy New Year. Due to the tremendous turnout for the December Christmas Party, we hope that the membership enjoyed the meeting. It is enjoyable to see the special interest groups being formed within the club. Currently we have groups for Macintosh owners, assembly language programmers, and educational software. 1985 promises to be a challenging year for Apple PI to meet the needs of the new members joining and retain the interest of the current members. Your assistance in helping us define the areas of interest is greatly desired. Contact me directly wit any suggestions you might have on either topic or subjects you would like presented to the club's general membership.

In January, I will be contacting various individuals to serve on a nominating committee for selecting a slate of officers and one director to be elected in May. This may seem pre-mature for some of you, but it takes time to locate the proper people, get their concurrence and then publish information about them in the SEED prior to the elections. If you are interested in running for any of the offices, please contact me and I'll pass your name along to the committee.

Bob Hein

HATS OFF!

For well over a year the Seed has been printed by Jack Norton. Jack owns Norton and Sons Printing. Not only has Jack done a super job on the Seed but as my guest at the Christmas party he was shanghaied into helping do disk copies. Thanks Jack!!!
If you like the looks of the Seed and you have a printing job, big or small, give Jack a call and tell him you are with Apple Pi.

Norton and Sons Printing.....466-7606

Randy

Print Codes

EMBEDDED PRINT COMMANDS FOR APPLE WRITER II
AND EPSON PRINTER

TO USE THE PRINT GLOSSARY:

After booting Apple Writer II, type CTRL-Q to get the "Additional Functions" menu. Then type E (IIe version) or 5 (II+ version) for loading a glossary file. Type the name of the glossary file (EPSON PRINT GLOSSARY). Type RETURN.

When ready to use (or "embed") a command, type CTRL-G to indicate that you want to use the glossary, then type the appropriate letter for the print feature you want to use. Repeat to embed additional commands

W to turn on double width characters
w to turn off double width characters
C to turn on compressed characters
c to turn off compressed characters
E to turn on emphasized print
e to turn off emphasized print
D to turn on double-striking
d to turn off double-striking
I to turn on Italics
i to turn off Italics
S to turn on subscript mode
s to turn off subscript mode
P to turn on superscript mode (DOES NOT WORK ON ALL EPSON PRINTER MODELS)
p to turn off superscript mode
U to turn on underlining
u to turn off underlining
0 to turn on 1/8" line feed
1 to turn on 7/72" line feed
2 to turn off either 1/8 or 7/72" line feed and return to normal 1/6" line feed.

TO CREATE THE PRINT GLOSSARY:

Clear Apple Writer's. memory. (Type N Y and RETURN.)

Press RETURN a second time.

Type the appropriate list below, ending each line with RETURN. Do not include the spaces. They were included for visual clarity only. indicates CONTROL. That is, V means CONTROL-V. SHIFT-E ndicates that the shift key should be held while E is pressed.

Type S and then EPSON PRINT GLOSSARY. Press RETURN.

Clear your memory again.

.Apple IIe List.

```
W  V   N   V
w  V   T   V
C  V   O   V
c  V   R   V
E  V  ESC SHIFT-E  V
e  V  ESC SHIFT-F  V
D  V  ESC SHIFT-G  V
d  V  ESC SHIFT-H  V
I  V  ESC 4  V
i  V  ESC 5  V
S  V  ESC SHIFT-S  V
s  V  ESC SHIFT-T  V
P  V  ESC SHIFT-S O  V
p  V  ESC SHIFT-T  V
U
u
0  V  ESC 0  V
1  V  ESC 1  V
2  V  ESC 2  V
```

Apple][+ on next page

PRINT CODES

.Apple II+ List.

```
W  V   N   V
w  V   T   V
C  V   O   V
c  V   R   V
E  V  ESC ESC ESC E  V
e  V  ESC ESC ESC F  V
D  V  ESC ESC ESC G  V
d  V  ESC ESC ESC H  V
I  V  ESC ESC 4  V
i  V  ESC ESC 5  V
S  V  ESC ESC ESC S  V
s  V  ESC ESC ESC T  V
P  V  ESC ESC ESC S O  V
p  V  ESC ESC ESC T  V
U ESC  SHIFT-P  u ESC  SHIFT-P
0  V  ESC 0  V
1  V  ESC 1  V
2  V  ESC 2  V
```

For further information on using these embedded print commands, refer to EPSON MAGIC.

Secretary —

DEC. 84

If you missed the Dec meeting, you missed a great chance to win some tremendous door prizes! Many of the door prizes were valued at over the $100. mark. There were so many awarded it was impossible to keep track of the names - but many, many names were called of members who weren't there -

Some of the benefits of Apple Pi are overlooked in the shuffle - one is the many newsletters from all over the country that are exchanged with other Apple clubs - some topics in these newsletters; special education, general education, Appleworks, PFS, just about any language you could think of, spreadsheets, Macintosh, etc. etc. etc. These newsletters are always available at CORE meets. Do not overlook the "junk mail" box, available at General Meetings. Occasionally the very software or hardware you have been looking for is being offered at a special rate to Apple Pi members.
The general meetings also have available a "new Apple member, owner" table, with Members available to answer all the "what do I do now"? type questions.
Utilize the clubs advantages and get your money's worth!!

WHAT'S UP ?

VP's Sneak Previews

3 Jan 85, 7 p.m., School of Mines Greene Center.

Steven Martin, our sysop, will demonstrate Macintosh software. January marks the one year point for the Macintosh. In addition Trent Hein may demonstrate a new game that runs on the Apple II.

7 Feb 85, 7 p.m., School of Mines Greene Center.

This month will tentatively be a telecommunications month, with live demonstrations of Compuserve and CARL

GOTO BACK COVER ($C)

LISP

Now a function to illustrate these new primitives. The function I decided on is the reverse function. This is a primitive function in XLISP. A primitive is a function intrinsic to a LISP interpreter, as opposed to functions written by a user in LISP. The point I want to make by writing a LISP primitive in LISP is to show that it can be done. LISP is fairly unique in its ability to describe itself in terms of itself. LISP can be described in terms of LISP by using a small number of primitives.

Before we begin, let's try the reverse function as it is in XLISP:

(reverse '(a b c)) returns (c b a)

As you can see, reverse simply reverses the order of the arguments (vsihn. id v list. Now, let's write the function in LISP. To avoid a name conflict, our function will be called rev.

```
(defun rev (x)
  (cond
  ((null x) '())
  (t (append (rev (cdr x))
             (list (car x))
     )
  )
  )
)
```

I pretty printed the function to make it easy to read. The interpreter does not care about how you type in the function as long as all parentheses are matched.

When rev is called, the argument it is called with will be bound with x. Next, x will be checked to see if it is an empty list. If it is, an empty list will be returned. If it is not, the next list will be examined. The next list will always yield true I made sure of that by starting the list with a t for true. Note that t is a special predefined atom. The list followed by the t says to append the rev of the cdr of x to the list made out of the car of x. The (rev (cdr x)) is a call to the function rev that we are defining (we are calling ourself from within ourself). We are calling rev with the cdr of x, which is to say the rest of the list x with the first element pulled out. Needless to say, if we do this enough times, x will become an empty list (the stop condition). Each call to rev will be evaluated based on the argument it was called with. Follow the sketched call chain--that is really the only way to understand what is going on. The interpreter is smart enoug to put together all the finished calls to complete the final value of the function regardless of how long it took for each intermediate call to evaluate. Intermediate results are held in abeyance until their final values can be substituted for the original call. Each intermediate call can call other functions and thus create uncompleted call chains of their own, each of arbitrary depths.

Examples using rev;

(rev '(a b c)) returns (c b a)
(rev '(I am (the walrus)))
returns ((the walrus) am I)
(rev '(here comes sniglet))
returns (sniglet comes here)
(rev '()) returns ()
(rev '(a)) returns (a)
(rev (rev '(v e p . . tasftcn ~v e p.
(rev (rev (rev (cons 'a '(b c)))))
returns
(c b a)

These concepts of recursion are universal, and well worth the struggling it takes to master them. Good luck.

---

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VP cont

(CARL is a free local library book data base with numerous participating libraries). Other modem services will also be shown.

7 Mar 85, 7 p.m., School of Mines Greene Center.

This month will tentatively be Mike Westerfield, author of ORCA/M and Crypto. Mike will be introducing some great new programs.

4 Apr 84, 7 p.m., School of Mines Greene Center.

This month will tentatively be "exotic language" month. This was originally Steven Martin's idea, and I really liked it. It may consist of demonstrations of languages such as; Forth, LISP, Prolog, Smalltalk, and any other languages we can work out demonstrations on. If you want to see a particular language, let me know! The more exotic and off-beat languages will have a priority over the more common ones. Hopefully, both Macs and II's will take part in this event.

Other software and hardware that will probably be shown at some time are;

1. Fontrix.
2. Pirate Pruf (one of the best copy protection software packages available).
3. Rana IBM drives for the Apple II (when they are on the shelves for public consumption).

If you missed the Steve Wozniak meeting, audio- visual tapes of the meeting can be purchased from club member Andy Schmidt for $12.00.

I don't know that Steve Jobs ever visits users groups, however, I have extended a written invitation to him.

Recently, through the kindns of a club member, I had the opportunity to meet Dr. Alan Kay of Apple computer. He was at Xerox when Xerox was researching what later became the technology behind Lisa and Macintosh. He is the inventor of the language "Smalltalk", which is an object oriented language that runs on the Lisa, and had some very interesting things to say about LISP and Prolog. I invited him to speak at our club, and he said that he probably would, but not for some time if he did. I will send a follow-up written invitation as soon as I get the chance.

Thanks for attending the meetings and staying with us through '84. It's good to have you with us, and I hope 1985 will be a great year for you and for the club.

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